



# **Disease Burden of PTSD in the US Military**

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# Objectives

- Define the Disability Adjusted Life Year (DALY) as a disease-generic estimate of disease burden.
- Present the parameters necessary to calculate the disease burden of PTSD.
- Present coarse disease burden estimates of PTSD in the US military.

# Why Assess Disease Burden?

- ✂ Quantify a “missed opportunity” or “lost potential” (e.g., years of life lost) resulting from a particular disease.
- ✂ Advocacy for resource allocation—prioritize importance of disease at the population-level.
- ✂ Utilitarian metric, to maximize the health of a society.
- ✂ Measured alone, disease pervasiveness, persistence, and impact do not sufficiently capture population health.
- ✂ **Disease burden combines**

# Why Assess Disease Burden?

## An example: Ischemic Heart Disease\* (IHD)

IHD ranks as the #1 most “burdensome” disease in the US.

Affects both length (mortality) and health-related quality of life (morbidity).

<b>Pervasive</b> (incidence)	Male	Female	Total
	860,527 (0.66%)	532,499 (0.39%)	1,393,026 (0.53%)

<b>Persistent</b>	Course (all ages) 2 years		
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<b>Impactful</b>	No. of Deaths	Yrs of Life Lost	Disability Weight (Morbidity)*
	536,314 (23%)	2,858,744 (16%)	0.11

\*IHD includes and combines Acute MI, Angina 1-year prior to final year, and Heart Failure.

(Michaud et al., 2006)

# Why Assess Disease Burden?

- **Depression ranks as #4**, on the same list as IHD (Michaud et al., 2006).
- How can a non-fatal disease be compared to IHD?
  - Especially when relatively few deaths are attributable to depression.
  - We do not typically think that years of life lost is on the same scale as health-related quality of life.
- **Disease burden measures population-level morbidity and mortality burdens along a common scale**



# Why PTSD?

## ✂ PTSD Burden in the US (Michaud et al., 2006)

- Ranks 15<sup>th</sup> (all races, both sexes, just under IHD but above HIV) in terms of morbidity.
- Ranks 17<sup>th</sup> in total disease burden (morbidity + mortality burden) in women.

## ✂ Military

- More pervasive (relatively speaking)
- More persistent (combat PTSD)
- More impactful

# Why PTSD?

## ✂️ PERVASIVE

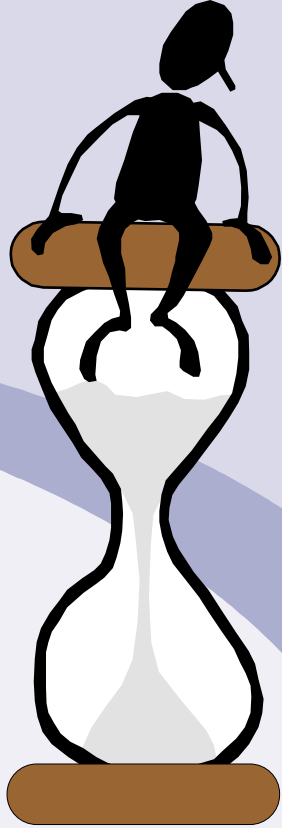
- Prevalence
  - Vietnam Veterans (NVVRS; Kulka et al., 1990): **9-15%** current
  - Desert Storm (as reported in Engel, 2006): **7-15%**
  - OEF/OIF (as reported in Hoge et al., 2004): **6-20%**
  - VA Primary Care (data collected in 1999; in Magruder et al., 2005): **12%**
  - 3 DoD PC Clinics (data collected 2005; Gore et al., in press): **9%**
- Incidence (Smith et al., 2008)
  - New onset 7.6-8.7% in deployers
  - New onset 2.3-3.0% in non deployers
  - New onset within a 2.7 years (mean) timeframe



# Why PTSD?

## ✂️ PERSISTENT

- US Disease burden (Michaud et al., 2006):
  - 4 years (males)
  - 5 years (females)
- NCS (Kessler et al., 1995):
  - 3 years in treatment
  - 5.33 no treatment
- NVVRS & HVVP (from Schnurr et al., 2003): **18.54 years**



# Why PTSD?

## ✂ IMPACTFUL

- Decrements in quality of life
  - Symptom severity correlated with poorer functioning (Magruder et al., 2005)
  - Symptom improvement was synchronous (vs lagged) with improvement in QoL (Schnurr et al., 2006)
- Other physical and mental health problems (Grieger et al., 2006; Gillock et al., 2005; Schnurr & Green, 2004)
- Increased use of medical services (Gillock et al., 2005)
- Increased employment absenteeism and higher medical costs (Berndt et al., 2000; Walker et al., 2003)

# Why PTSD?

## ✂-TREATABLE

- Psychotherapy (Bradley et al., 2005; Bisson et al., 2007)
- Pharmacotherapy (Davidson, 2006; Ipser et al., 2006; Davis et al., 2006)

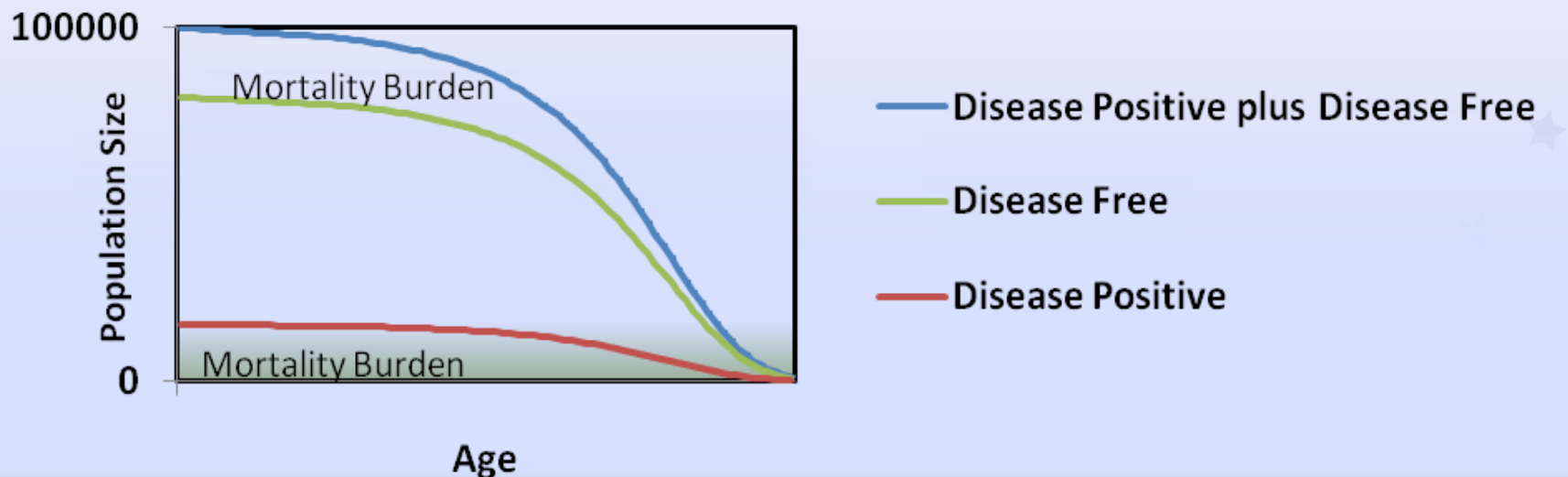
## • PREVENTABLE?



*"Could we up the dosage? I still have feelings."*

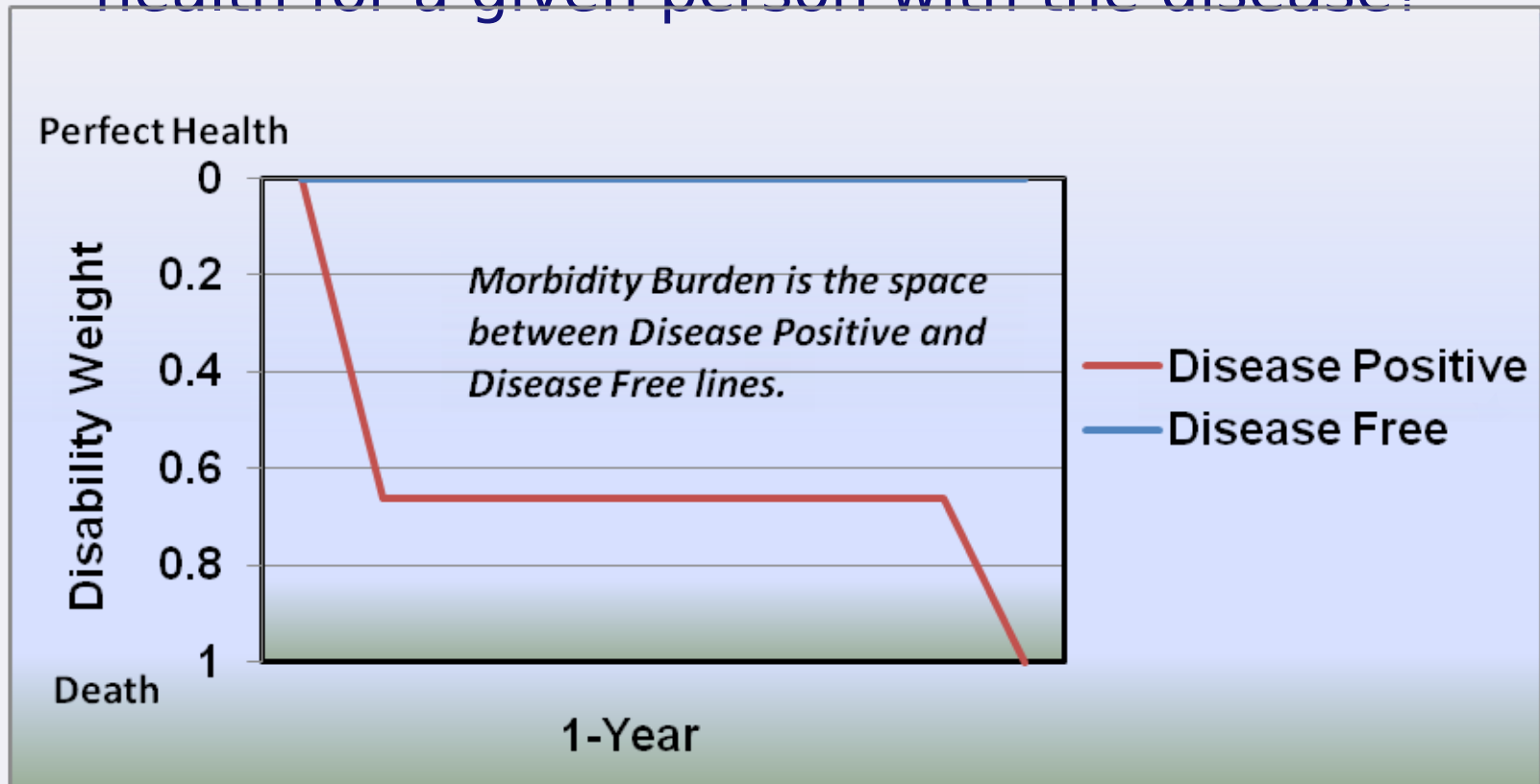
# What is Disease Burden?

- Summary measure of population health that estimates the “gap” or difference between actual population health and some specified norm or goal (WHO, 2001).
- Morbidity + Mortality



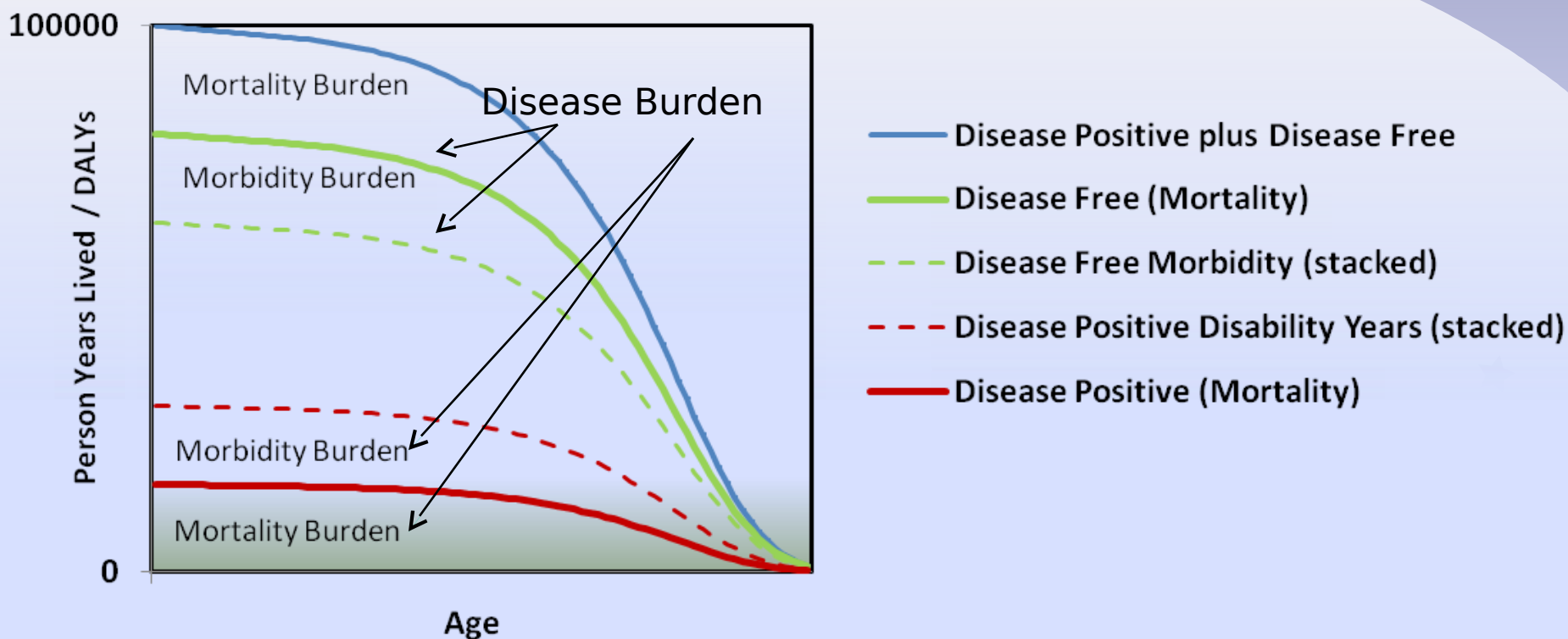
# What is Disease Burden?

- Valuing health... morbidity
- How many years in a disease state (i.e., disability) is equivalent to 1 year of perfect health for a given person with the disease?



# What is Disease Burden?

- = Mortality + Morbidity Burden on the same scale.





# What is Disease Burden?

## Disability Adjusted Life Year (DALY)

=

### Mortality

Years of Life Lost  
(YLL)

(Fatal diseases only)

### Morbidity

Years Lost Due to Disability  
(YLD)

(Fatal and Non-Fatal  
Diseases)

Pervasiveness  
Incidence

x

Persistence  
Course

x

Impact  
Disability  
Weight

x

Age  
Adjustment

x

Discount  
Rate

- DMED
- Smith et al. (2008)

Combat versus  
Non-combat  
estimates

- GBD Study (Murray & Lopez, 1996)
- Replication Study (Michaud et al., 2006)

Optional &  
Controversial



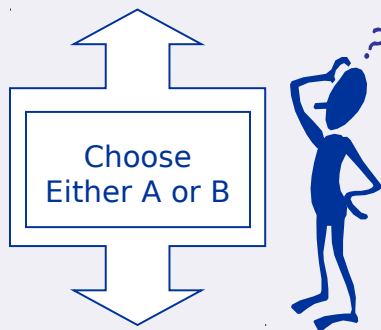
# How Health is Valued

## Example of a Person Tradeoff

(adapted from Freed et al., in press; Sanderson & Andrews, 2001)

### **Intervention A**

Extend the life of 1000 healthy people for 1 year. All 1000 people will die after 1-year. If don't choose Intervention A, then all will die today.



### **Intervention B**

Extend the life of  $n$  individuals with the disabling condition of interest for 1-year. All  $n$  individuals will die after 1-year. If don't choose Intervention B, then all will die today.

Disability weight =  $1 - 1000/n$ , where the respondent is indifferent between A and B. It is a ratio of  $1000 : n$ , where the minimum  $n = 1000$  (best health) and the maximum  $n = 1$  million (indicating worst health). The disability weight therefore falls between 0.001 and 1.

# Method

## ✂- **Pervasiveness: Incidence**

- Provider diagnosis from Defense Medical Epidemiological Database (DMED)
  - Ambulatory data by branch and age in 2007
  - First occurrence diagnosis ICD 309.81
- Self-report questionnaire from the Millennium Cohort Study (MCS), sensitive criteria (Smith et al., 2008)
  - By branch
  - PCL-C with DSM-IV criteria (at least moderate distress)

## ✂- **Impact: Disability Weights**

- GBD (estimation): 0.11 (Murray & Lopez, 1996)
- Replication (actual PTO): 0.66 (Sanderson & Andrews, 2001)

# Method

## ✂ Persistence

- GBD: 4 years (males), 5 years (females)
- NCS: 3 years in treatment & 5.33 no treatment (Kessler et al., 1995)
- NVVRS & HVVP: 18.54 years (from Schnurr et al., 2003)
- PTSD screener study: 38% combat PTSD (Gore et al., in press)
- Our estimate: 9.67 years

## ✂ Mortality: Years in PTSD vs. Not

- Assessed with a life table using rates from a US white male population in CY2004.

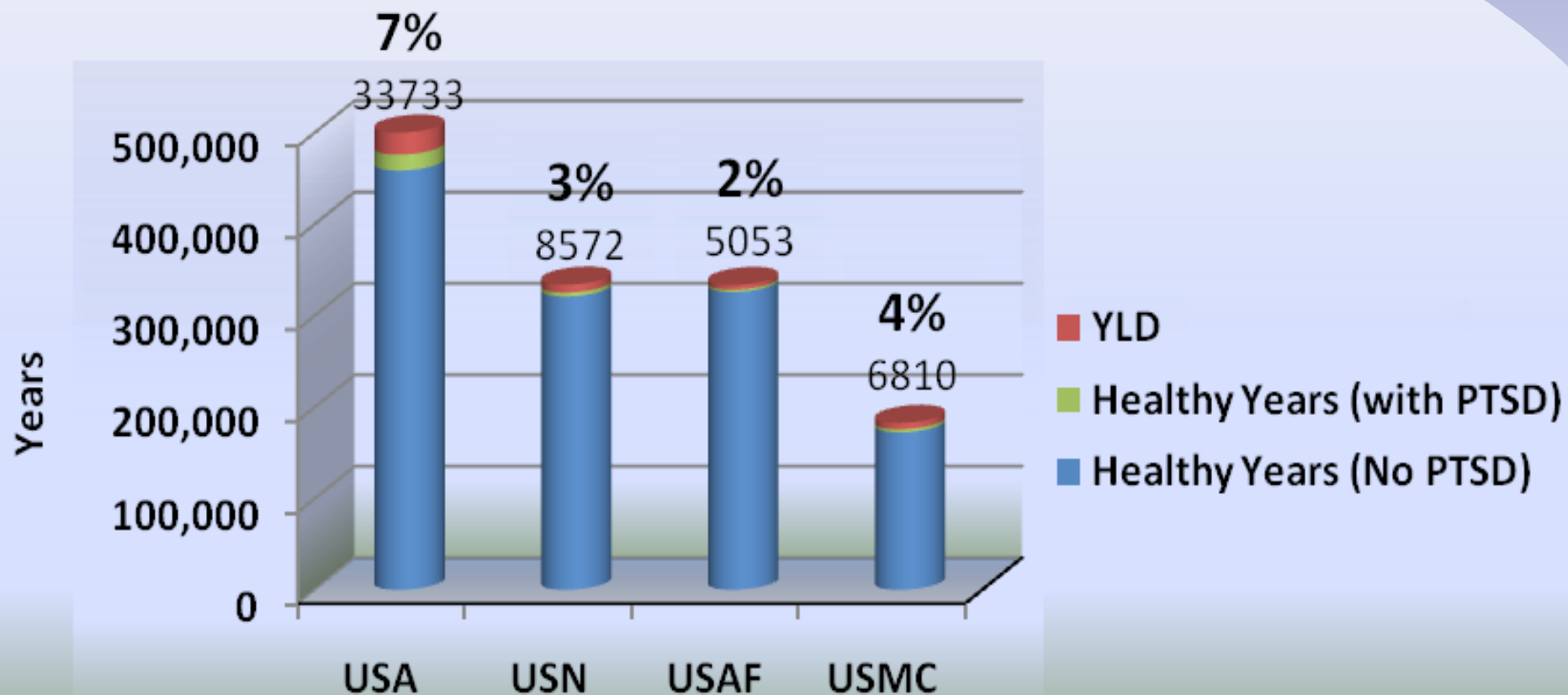
# Method

## ✂ Model parameters for sensitivity analyses

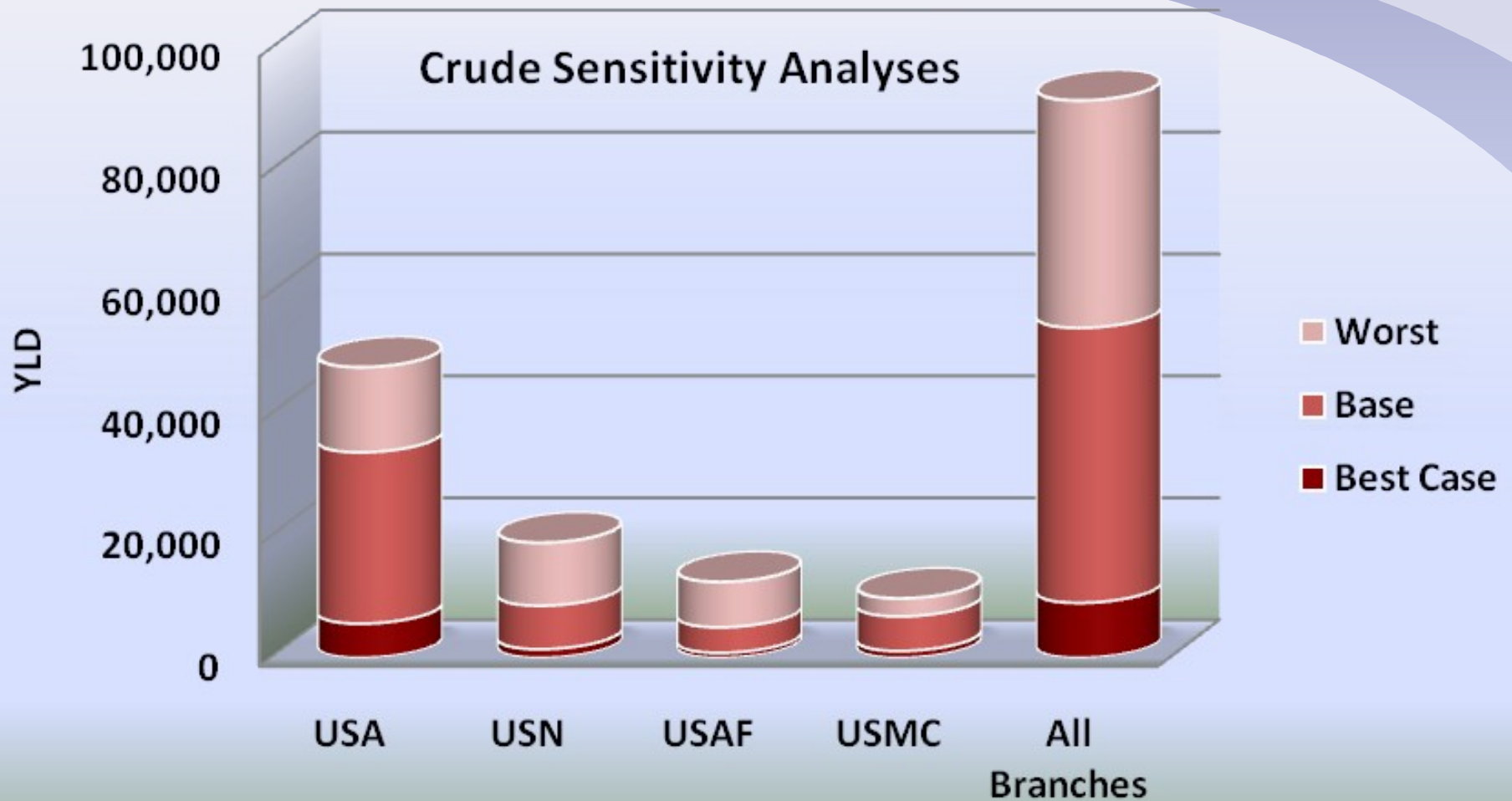
- Base Case
  - Incidence from DMED
  - Disability weight: 0.66 Sanderson & Andrews (2001)
- Worst Case
  - Incidence from MCS, sensitive criteria
  - Disability weight: 0.66
- Best Case
  - Incidence from DMED
  - Disability weight from GBD: 0.11

# Results

## Disease Burden (YLD) of PTSD: Base Case

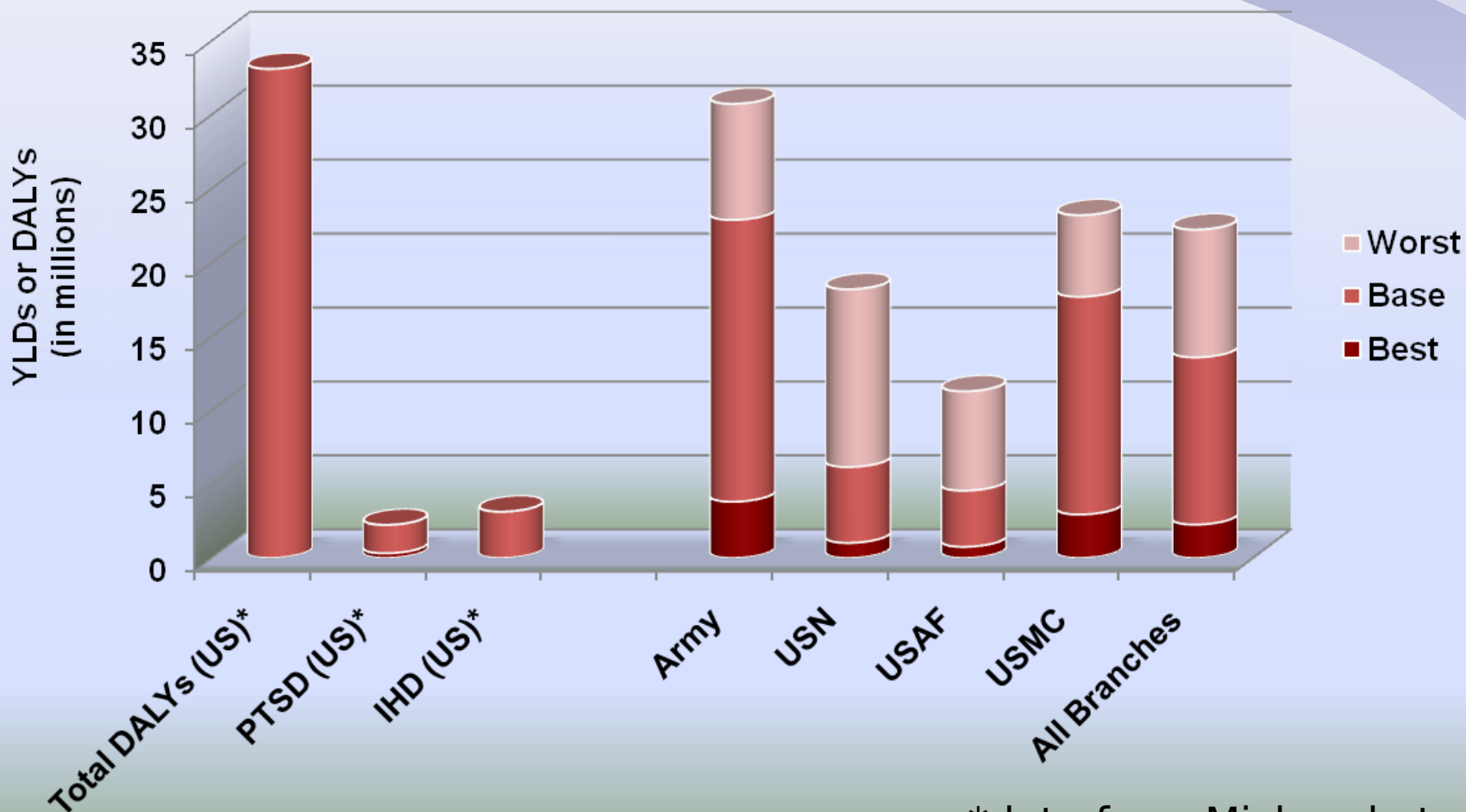


# Results



# Results

Disease Burden Comparison:  
What if the Military Was Representative of the General US Population?



\*data from Michaud et al.,

# Discussion & Conclusion

- ✂ Prioritize diseases based on pervasiveness, persistence, and impact
- ✂ Differences in service branches due to differences in pervasiveness (in our model)
- ✂ If model parameters change, then estimates change
  - PTSD in military (scaled) vs. IHD in general population
  - Disability weight: 0.11 (estimation in GBD) vs. 0.66 (actual PTO in replication study)



# Limitations

- ✂ Service utilization from DMED data has its drawbacks
- ✂ Patchwork model parameters
- ✂ US white male life table may not be representative of a military population
- ✂ Disability weights may not reflect military preferences
- ✂ We do not have the overall disability measurements within the military. Thus, percentages of YLDs may be inflated.
- ✂ Crude sensitivity analysis did not account for discounting or age weighting

Progress not Perfection

# Future Directions

- ✂- A comprehensive dataset to include mortality and morbidity in servicemembers and veterans.
- ✂- Service member preferences for most relevant diseases within DoD and VA.
- ✂- Comparison of resources devoted to the prevention, treatment, and researching of the diseases being studied.
- ✂- Longitudinal trend in disease burden as a function of resources devoted to prevention, treatment, and research.

# Questions, Information, & Assistance

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# Incidence Rates Used

Branch	DMED	MCS 1-Year (Smith et al., 2008)	US Burden of Disease (Michaud et al., 2006)	Population Size
All	0.80%	1.31%		1,360,798
USA	1.35%	1.82%		510,390
USN	0.36%	1.07%		334,077
USAF	0.27%	0.67%		333,664
USMC	1.04%	1.37%		182,667
US Population (Males)			0.09%	129,810,215
US Population (Females)			0.23%	135,473,568